MILITARY TECHNOLOGY:

NEW CHALLENGES FOR US NATIONAL SECURITY STRATEGY

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MILITARY TECHNOLOGY:

NEW CHALLENGES FOR US NATIONAL SECURITY STRATEGY

In early 1991, the United States successfully fought a mid-level conventional war using a force structure with high technology weapons developed to counter the Soviet Union, our old Cold War adversary. However, the opponent in the Gulf War was Iraq, a heavily armed Third World state with an aggressive nuclear weapons program, not the Soviet Union. By the end of 1991, the Soviet Union had disintegrated; and the Cold War abruptly ended.

These stunning events precipitated an intense review of a United States' national security strategy and military force structure overwhelmingly based on containing communism and nuclear deterrence. As demonstrated during the Gulf War, advanced military technology plays an important role in both our strategy and current force structure. The war also underscored the need to address the growing proliferation of weapons technology in the Third World. In March 1991, Secretary of Defense Dick Cheney highlighted the technology issue in stating "we are on the verge of a revolutionary period in military technology, with leading nations achieving major breakthroughs and smaller nations gathering access to weapons of mass destruction."[1] This paper will focus on the current role of technology in US strategy, technology issues from the Gulf War, and future military technology challenges for the United States.

TECHNOLOGY ROLE IN US STRATEGY

Americans have a long-standing love affair with technology. Carl Builder identifies technology as the dominant idea in American society over the past 40 years along with the philosophy of

"science can do anything, take us anywhere."[2] Generations of Americans, many represented in government and military leadership circles, have witnessed the evolution of automobiles, aircraft, television, microwaves, communications, computers, satellites, and countless other technological marvels. These marvels helped transform our society into a highly industrialized nation with a high standard of living as technology shaped our approach to problem-solving - whether the task was finding a polio vaccine or landing a man on the moon. Our heritage and experience with technology also fostered a distinctly "American" approach to defense planning and warfare.

Basically, our military strategy and force structure are products of our economy. This century's focus on mass production, mass consumption, mass education, and mass communications supported the military's evolution into mass armies and concepts of mass destruction. Alvin and Heidi Toffler emphasize this strong connection between a country's system for creating wealth and its system for making war. Essentially, different types of economies produce different military styles and force structures.[3]

We came out of World War II a superpower, supremely confident in our capacity to wage war based on seemingly unlimited industrial capacity, resources, manpower, and the technological trump card, the atomic bomb. As budget cuts and manpower deficiencies created gaps in military capability, the United States increasingly invoked the technology "problem-solving" technique to substitute machines for scarce manpower and to balance forces against a quantitatively superior opponent. Soon, buzz phrases such as "do more with less," "more bang for the buck," and "force multiplier" began formalizing a technology-driven strategy.

Eventually, this strategy drove the type of weapons procured; the type of people recruited; the type of training conducted. Massive procurement buys, a conscript service, and generalized training were soon replaced with fewer, more specialized weapons, an all-volunteer force, and tailored training. Computer-assisted weapon systems were given to a Nintiendo generation of recruits who grew up with personal computers, electronic calculators, portable phones, and digital watches. Technology is a pervasive element in our society; today, it's fully institutionalized in our approach to national security and warfare.

The 1991 National Security Strategy of the United States recognizes technology's historic role in providing comparative advantage for American forces and our reliance on it to overcome numerical disparities. The spread of advanced systems is viewed as eroding our competitive edge in warfare "unless we act decisively to maintain technological superiority." This strategy also acknowledges the strong interrelationship between economic and military strength and emphasizes concern over the loss of technological leadership affecting military readiness and strength.[4]

Our national commitment to technology's continued prominence in US strategy is reinforced in the 1992 National Military Strategy of the United States which lists "Technological Superiority" as one of eight strategic principles to capitalize on our strengths:[5]

> The United States must continue to rely heavily on technological superiority to offset quantitative advantages, to minimize risk to US forces, and to enhance the potential for swift, decisive termination of conflict . . . . Advancement in and protection of technology is a national security obligation.

This continued emphasis on technology is bringing the United States to that "revolutionary period" identified by Secretary Cheney.

Basic changes in our economic process are driving revolutionary change in our approach to warfare. Today's economy and warfare are increasingly knowledge-driven. Production emphasis on customization, precision, and waste reduction finds parallel military effort in specialized systems, precision-guided weapons, and reduction in collateral or unnecessary damage. The Tofflers characterize this revolutionary change as the "de-massification of production leading to the de-massification of destruction."[6]

The new Joint Pub 1, Joint Warfare of the US Armed Forces, also identified that "the rapid evolution of technology in the postindustrial era (with its dramatic advances in information processing, advanced materials, robotics, and precision munitions) has altered warfare."[7] All-weather, night capable, extremely precise weapon systems; extensive information management and communications networks; and space-based military support capabilities have definitely revolutionized conventional warfare. Validation of America's "technology" approach to knowledge-driven warfare came during the 1991 Gulf War.

THE GULF WAR: A WATERSHED EVENT FOR TECHNOLOGY

Technology dreams and nightmares took form during the Gulf War. America's vision of "high tech" warfare came of age. Television showed the American people that our high tech weapons work; the United States can fight a destructive war with minimum casualties; and we possess a capability to protect Americans from ballistic missiles.[8] On the other hand, the war slammed home the real dangers of nuclear and ballistic missile proliferation in the Third World. Both technology successes and threats will shape future decisions on strategy and force structure.

The United States employed an entire new generation of sophisticated weapon systems including the F-117 stealth aircraft, Tomahawk Land Attack Missile (TLAM), and Patriot air defense system. The advent of stealth systems, precision-guided weapons, space-based support, and use of ballistic missile defenses made a revolutionary impact on our approach to warfare.

The F-117 proved to be the US technology trump card - an advanced system combining stealth and precision delivery to provide both surprise and mass against the enemy. The F-117 force flew only 2% of the war's total sorties but covered 40% of the strategic target list. The stealth systems risk fewer aircrew and reduce total sorties; therefore, overall requirements for munitions, manpower, and fuel can also be reduced.[9] Precision-guided munitions (PGM) also reduce sortie requirements. Vietnam memories of nearly 900 sorties to destroy one bridge were rapidly replaced by CNN television footage of PGMs hitting designated doorways, windows, and airshafts and destroying the target with one missile.

Another high tech arena spotlighted during the war was space-based support to conventional military operations. General Donald Kutyna, Commander-in-Chief of US Space Command, characterized DESERT STORM as "the first campaign level combat operation where space systems were solidly integrated into combat operations and proved vital to the degree of success in the conflict." Satellite systems carried over 90 percent of the communications to and from the theater of operations and proved critical in a region which lacked any kind of viable communications infrastructure. Navigation, weather data, targeting locations, troop positions, and search and rescue data were just some of the tactical requirements met by the United States' array of satellites.[10]

Theater missile systems reached new lows and highs during the war. Who can forget watching TV film of Iraqis pointing out a low flying Tomahawk missile heading for a target in heavily defended Baghdad? This missile system passed its first combat test by striking targets in high threat areas under poor weather and light conditions which proved unsuitable for aircraft missions.

Most publicity, however, spotlighted another missile system called upon to counter Iraq's SCUD missile attacks against populations in Israel and Saudi Arabia. The high-flying Patriot anti-aircraft missile system was originally designed to provide point defense against attacking aircraft. Faced with an urgent need for some kind of defense, the Patriot was modified to provide anti-tactical ballistic missile capability for a limited area. Despite software problems and a questionable intercept success rate, the Patriot played a critical role in keeping Israel out of the war and the coalition intact by providing some defense capability and a morale boost for the civilian populations.[11] More importantly, the Patriot demonstrated a ballistic missile defense (BMD) capability and generated tremendous interest in defensive technologies and BMD issues.

And what about the technology nightmares presented by the Gulf War? Without a doubt, Iraq's potential use of chemical weapons and actual conventional SCUD ballistic missile attacks against civilian populations prompted the most concern during the war. However, the bigger shock came after the war as United Nations inspection teams uncovered an aggressive nuclear weapons program which was much further developed than previously estimated. In fact, some military leaders believe Iraq's biggest mistake was going to war before its nuclear weapons program was completed.[12]

For decades, US strategy has viewed nuclear and ballistic missile threats within the framework of superpower confrontation. Due to the size of their arsenals, the declared nuclear powers developed a regime centered on the military and cost effectiveness of nuclear weapons as well as a healthy tradition of nonuse for fear of escalation. As seen during the Gulf War, the United States now faces the likelihood of dealing with a Third World nuclear-capable state with very different views of nuclear warfare.

Third World states seek nuclear weapons for different reasons: a symbol of power, to counter regional security threats, to offset First World advantages in conventional military power and advanced military technology, or to replace support previously generated by the superpower confrontation.[13] Capability to directly attack the United States does not appear to be a factor at this time. More likely, Third World states would use nuclear weapons as a political instrument - to destabilize a situation, to terrorize neighboring states, to prevent US interference, or to threaten US forces within the region and our allies.

But how realistic are our dreams and nightmares from the Gulf War? Let's start with a closer look at that TV "vision" of success. First of all, the Gulf War was fought under unusually favorable conditions. Secure bases, ports, and staging areas; air supremacy; worldwide support; and six months to deploy, plan, and stockpile supplies gave the United States an overwhelming advantage not likely in a "come as you are" war requiring immediate combat. Any evaluation of combat effectiveness must be viewed within this favorable context.

Secondly, the TV view rarely focused on the large, complex support organizations required to effectively employ our high tech

arsenal. Our advanced weaponry requires sophisticated, highly integrated information and logistics support which is rarely acknowledged as part of the weapon system, especially when assessing weapon system effectiveness and vulnerabilities.[14] High tech weapons are frequently advertised as cost effective based on production costs compared with the cost of the target destroyed, e.g. a $2 million missile destroys a $7 million radar system. However, this simplistic cost evaluation fails to include the costs of the delivery platform, the supporting command, control, communications, and intelligence (C3I) network, information and data base requirements, target surveillance and identification systems, and the people to operate the systems.

Many of these support organizations are extremely vulnerable to disruption, neutralization, or destruction from military operations using simple technology. The support organizations usually possess less redundancy, duplication, or protection features than the weapon itself. Replacements for highly sophisticated computer and communications network components may be extremely scarce or nonexistent. Not only do we have to worry about the enemy developing countermeasures to our weapons, there is an increasing danger of adversaries developing a strategy to attack our vulnerable support structure rather than the weapon systems themselves.[15]

The proliferation dilemma also deserves closer scrutiny. Basically, Iraq employed a low tech SCUD ballistic missile as a terror weapon against Israel and Saudi Arabia and forced the United States to take extreme steps to keep Israel from retaliating against Iraq. These steps tied up significant combat resources including the equivalent of three squadrons of aircraft to "hunt"

SCUDs.[16] Today's arms market may not sell small countries the most advanced, state-of-the-art weapons but can provide them weapons capable of threatening or disrupting US operations.

The Gulf War demonstrated the limitations to deterring proliferation. Iraq is a signatory to the 1925 Geneva Protocol, prohibiting use of chemical weapons, and the 1968 Nuclear Non-Proliferation Treaty. However, Iraq used chemical weapons during its eight-year war with Iran and actively pursued a nuclear weapons program.[17] Even efforts to destroy Iraq's nuclear development capability have had mixed results. First, we underestimated the extent of the program. Secondly, the United Nations inspection team has encountered extreme difficulties in locating program components for destruction and in verifying that Iraq hasn't simply relocated or regenerated its program.

In the end, some of our high tech visions did come true; others did not. Some threats proved inconsequential; new ones materialized. The real challenge is to keep success in perspective and not let visions of superiority and invincibility gloss over real technology challenges for the future.

FUTURE MILITARY TECHNOLOGY CHALLENGES

So what are these future military technology challenges for the United States and what approach should we take to meet them? Technology challenges include costs and size of a high tech force structure, employment limitations, and proliferation.

Although we will continue to want "high tech" solutions, economic and social demands to reduce defense spending will limit the size of our force structure. Traditional risk-benefit analyses of weapon systems have only focused on weapon performance while

excluding the performance, costs, and vulnerabilities of the systems' large support organizations. This process has led to the overestimation of weapon effectiveness and the underestimation of costs and vulnerabilities.

Costs may drive the United States into maintaining a smaller force structure with less employment flexibility than today's force. This smaller force may no longer possess the diverse capabilities nor sufficient resources to handle a more sophisticated, traditional opponent. Conversely, high tech force support requirements may be too large for timely, responsive employment in small-scale operations.[18]

Finally, the nuclear weapons club is growing. Proliferation of nuclear and ballistic missile technology is alive and well in the 1990s. Within the world of proliferation, traditional forms of nuclear deterrence may no longer apply. The United States must face the likelihood of nuclear "blackmail" or threatened use against US forces in future Third World conflicts.

The United States must develop a strategy to meet these technology challenges and focus on the following objectives:

1. The United States must retain freedom to intervene in regional conflicts where US vital interests may be affected without being deterred by an adversary's small nuclear capabilities or other advanced weapons.[19]

2. The United States must maintain forces to meet the broadest range of national security policy objectives.

3. US forces must be capable of establishing military superiority quickly. Because future military conflicts are likely to be shorter and more intense, we may have insufficient time to deploy massive force.

4. Weapon systems must meet valid military requirements. We cannot let modernization of our systems become an end in itself nor let "invention become the mother of application."[20]

5. Research and development must focus on technologies which meet warfare performance requirements but also help reduce the total force structure costs.

This strategy would be implemented by initiatives to maintain US freedom of action, a balanced force capability, technological superiority, and weapon system effectiveness. In addition, future critical technologies must be prioritized for development.

Freedom of Action: Maintain a credible capability to disarm an adversary's weapons of mass destruction. Develop and deploy a defense against limited ballistic missile attack.

Balanced Force Capability: Future situations requiring military force will not all need a high tech solution nor employment of massive force. Balance high tech capability with more responsive, less vulnerable forces for small-scale operations.

Technological Superiority: Continue support of breakthrough or innovative technologies to provide the United States with periodic "trump card" capabilities, e.g. stealth, cruise missiles, submarine-launched missile systems, atomic bomb. Pursue evolutionary improvements to weapon systems and support organizations. Marginal improvements may prove cost effective and provide significant advantage over an enemy's capabilities.

Weapon System Effectiveness: Emphasize accurate risk-benefit analyses reflecting weapon performance as well as the performance, costs, and vulnerabilities of weapon system support organizations. Ensure vulnerable support organizations critical to weapon system effectiveness are protected by redundancy, mobility, hardening,

duplication, physical protection, or other appropriate method.

Future Technologies: Place increased emphasis on missile technologies, strategic defense technology programs, and space-based tactical technology applications. Economics preclude pursuing all potentially useful advanced technologies. The Bush Administration has already identified eight critical technologies for research and development: air-breathing propulsion, composite materials, machine intelligence/robotics, passive sensors, photonics, semiconductors, sensitive radars, and superconductivity.[21]

Many of these initiatives will be taken unilaterally by the United States; others could benefit by a multilateral approach - especially to counter the proliferation threat. The objective would be the same as with superpower nuclear confrontation: Minimize the chance that nuclear weapons will be used and the levels of devastation that would result if they were used.[22] With a Third World nuclear capable state, the objective may be the same; but the approach will differ. A multi-faceted approach to the proliferation problem should address the following elements:[23]

1. Security guarantees and arms control arrangements to deter nations from seeking missiles or weapons of mass destruction.

2. Threat of direct intervention to prevent use or terminate conflict at lower levels of destructiveness.

3. Threat of retaliation, economic sanctions, international isolation.

4. Tightened export controls by supplier states of critical weapons technologies.

5. Efforts to encourage political change in a government's view of the need for weapons of mass destruction, their usefulness, and the consequences of use.

6. Public exposure of a government's nuclear weapons program and the unacceptable nature of its existence.

The Gulf War gave us a window on the future, a future where containing communism no longer dominates our national security strategy and nuclear deterrence no longer means preventing global nuclear war. In a sense, we miss our old adversary, the Soviet Union, and the focus and simplicity it gave to our national security strategy and military force structure. In its place, we now face an array of regional security issues which still demand a credible military capability. That capability may be reduced, but the prominent role of advanced military technology is assured.

The Gulf War set a new benchmark for high tech warfare. We are truly on the "verge of a revolutionary period in military technology." How well our high tech breakthroughs counter proliferating Third World threats will be based on how effectively we balance high tech strengths and weaknesses in our strategy and force structure.

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